

WHAT IS CLAIMED IS

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1. A liquid jet head comprising:

a nozzle element having nozzles from which a recording liquid is ejected to a recording medium,

wherein the recording liquid contains fine

10 particles of a pigment,

wherein the fine particles of the pigment

contained in the recording liquid are no less than 1% by weight,

wherein each of the nozzles has an area that

15 is less than $500\mu\text{m}^2$,

wherein each of the fine particles of the

pigment has a diameter satisfying a relation of $0.0005 \leq D_p/D_o \leq 0.02$,

wherein "Dp" represents the diameter of each

20 of the fine particles of the pigment and "Do" represents a size of each of the nozzles,

wherein when the nozzle element ejects the recording liquid onto the recording medium, a contact angle of the recording liquid stops changing when 100 ms

25 or less elapses after the recording liquid contacts the

recording medium,

wherein the fine particles of the pigment are smaller than fibers of the recording medium,

wherein the fine particles of the pigment are
5 smaller than spaces between the fibers of the recording medium.

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2. The liquid jet head as claimed in claim 1, wherein the fine particles of the pigment are dispersed in the recording liquid by including a dispersant in the recording liquid.

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3. The liquid jet head as claimed in claim 1,
20 wherein the fine particles of the pigment are dispersed in the recording liquid by surface processing the fine particles of the pigment.

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4. The liquid jet head as claimed in claim 1,
wherein the fine particles of the pigment contained in
the recording liquid range from 2% to 10% by weight,
5 wherein a solid content of the recording liquid
including the fine particles of the pigment contained in
the recording liquid is no more than 15% by weight.

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5. The liquid jet head as claimed in claim 1,
further comprising one or more other nozzle elements
respectively having nozzles from which one or more other
15 recording liquids are ejected to the recording medium.

20 6. The liquid jet head as claimed in claim 5,
wherein the one or more other nozzle elements are
integrally formed to thereby form a head unit.

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7. The liquid jet head as claimed in claim 6,
wherein the head unit has a recording head portion and a
recording liquid container portion,
5 wherein the recording head portion and the recording
liquid container portion are integrally formed.

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8. The liquid jet head as claimed in claim 6,
wherein the head unit has a recording head portion and a
recording liquid container portion,
wherein the recording liquid container portion is
15 detachably attached to the recording head portion.

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9. The liquid jet head as claimed in claim 8,
wherein the recording liquid container portion is
detachable according to type of the one or more other
recording liquids.

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10. The liquid jet head as claimed in claim 1,
wherein the liquid jet head employs a thermal liquid jet
5 method which uses heat for ejecting recording liquid
therefrom.

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11. A liquid jet head comprising:
a nozzle element having nozzles from which a
recording liquid is ejected to a recording medium,
wherein the recording liquid contains fine
15 particles of a pigment,
wherein the fine particles of the pigment
contained in the recording liquid are no less than 1% by
weight,
wherein each of the nozzles has an area that
20 is less than $500 \mu\text{m}^2$,
wherein each of the fine particles of the
pigment has a diameter satisfying a relation of $0.0005 \leq$
 $D_p/D_o \leq 0.02$,
wherein "Dp" represents the diameter of each
25 of the fine particles of the pigment and "Do" represents

a size of each of the nozzles,

wherein when the nozzle element ejects the recording liquid onto the recording medium, a contact angle of the recording liquid stops changing when 100 ms or less elapses after the recording liquid contacts the recording medium,

wherein the recording medium has a surface coated with a coating material,

wherein the fine particles of the pigment have an average diameter that is equal to or less than an average diameter of particles forming the coating material,

wherein the average diameter of the fine particles of the pigment is smaller than smoothness of the coated surface of the recording medium.

12. The liquid jet head as claimed in claim 11, wherein the fine particles of the pigment are dispersed in the recording liquid by including a dispersant in the recording liquid.

13. The liquid jet head as claimed in claim
11, wherein the fine particles of the pigment are
5 dispersed in the recording liquid by surface processing
the fine particles of the pigment.

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14. The liquid jet head as claimed in claim
11, wherein the fine particles of the pigment contained
in the recording liquid range from 2% to 10% by weight,
wherein a solid content of the recording liquid
15 including the fine particles of the pigment contained in
the recording liquid is no more than 15% by weight.

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15. The liquid jet head as claimed in claim
11, further comprising one or more other nozzle elements
respectively having nozzles from which one or more other
recording liquids are ejected to the recording medium.

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16. The liquid jet head as claimed in claim
5 15, wherein the one or more other nozzle elements are
integrally formed to thereby form a head unit.

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17. The liquid jet head as claimed in claim
16, wherein the head unit has a recording head portion
and a recording liquid container portion,
wherein the recording head portion and the recording
15 liquid container portion are integrally formed.

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18. The liquid jet head as claimed in claim
16, wherein the head unit has a recording head portion
and a recording liquid container portion,
wherein the recording liquid container portion is
detachably attached to the recording head portion.

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19. The liquid jet head as claimed in claim
5 18, wherein the recording liquid container portion is
detachable according to type of the one or more other
recording liquids.

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20. The liquid jet head as claimed in claim
11, wherein the liquid jet head employs a thermal liquid
jet method which uses heat for ejecting recording liquid
15 therefrom.

20 21. A liquid jet head comprising:
a nozzle element having nozzles from which a
recording liquid is ejected to a recording medium,
wherein the recording liquid contains fine
particles of a pigment,
25 wherein the fine particles of the pigment

contained in the recording liquid are no less than 1% by weight,

wherein each of the nozzles has an area that is less than $500\mu\text{m}^2$,

5 wherein each of the fine particles of the pigment has a diameter satisfying a relation of $0.0005 \leq D_p/D_o \leq 0.02$,

 wherein "Dp" represents the diameter of each of the fine particles of the pigment and "Do" represents
10 a size of each of the nozzles,

 wherein when the nozzle element ejects the recording liquid onto the recording medium, a contact angle of the recording liquid stops changing when 100 ms or less elapses after the recording liquid contacts the
15 recording medium,

 wherein the recording medium is a resin material having a surface coated with a coating material,

 wherein the fine particles of the pigment have an average diameter that is equal to or less than an
20 average diameter of particles forming the coating material,

 wherein the average diameter of the fine particles of the pigment is smaller than smoothness of the coated surface of the recording medium.

22. The liquid jet head as claimed in claim
5 21, wherein the fine particles of the pigment are
dispersed in the recording liquid by including a
dispersant in the recording liquid.

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23. The liquid jet head as claimed in claim
21, wherein the fine particles of the pigment are
dispersed in the recording liquid by surface processing
15 the fine particles of the pigment.

20 24. The liquid jet head as claimed in claim
21, wherein the fine particles of the pigment contained
in the recording liquid range from 2% to 10% by weight,
wherein a solid content of the recording liquid
including the fine particles of the pigment contained in
25 the recording liquid is no more than 15% by weight.

5 25. The liquid jet head as claimed in claim
21, further comprising one or more other nozzle elements
respectively having nozzles from which one or more other
recording liquids are ejected to the recording medium.

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 26. The liquid jet head as claimed in claim
25, wherein the one or more other nozzle elements are
15 integrally formed to thereby form a head unit.

20 27. The liquid jet head as claimed in claim
26, wherein the head unit has a recording head portion
and a recording liquid container portion,
wherein the recording head portion and the recording
liquid container portion are integrally formed.

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28. The liquid jet head as claimed in claim
5 26, wherein the head unit has a recording head portion
and a recording liquid container portion,
wherein the recording liquid container portion is
detachably attached to the recording head portion.

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29. The liquid jet head as claimed in claim
28, wherein the recording liquid container portion is
15 detachable according to type of the one or more other
recording liquids.

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30. The liquid jet head as claimed in claim
21, wherein the liquid jet head employs a thermal liquid
jet method which uses heat for ejecting recording liquid
therefrom.

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31. A liquid jet recording apparatus

5 comprising:

a liquid jet head including a nozzle element
having nozzles from which a recording liquid is ejected
to a recording medium;

a carriage mounting the liquid jet head;

10 a guiding rod guiding the carriage;

a conveying roller conveying the recording
medium;

a holding roller holding the recording medium,

wherein the recording liquid contains fine
15 particles of a pigment,

wherein the fine particles of the pigment
contained in the recording liquid are no less than 1% by
weight,

wherein each of the nozzles has an area that
20 is less than $500 \mu\text{m}^2$,

wherein each of the fine particles of the
pigment has a diameter satisfying a relation of $0.0005 \leq$
 $D_p/D_o \leq 0.02$,

wherein "Dp" represents the diameter of each
25 of the fine particles of the pigment and "Do" represents

a size of each of the nozzles,

wherein when the nozzle element ejects the recording liquid onto the recording medium, a contact angle of the recording liquid stops changing when 100 ms
5 or less elapses after the recording liquid contacts the recording medium,

wherein the fine particles of the pigment are smaller than fibers of the recording medium,

wherein the fine particles of the pigment are
10 smaller than spaces between the fibers of the recording medium.

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32. The liquid jet recording apparatus as claimed in claim 31, wherein the fine particles of the pigment are dispersed in the recording liquid by including a dispersant in the recording liquid.

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33. The liquid jet recording apparatus as
25 claimed in claim 31, wherein the fine particles of the

pigment are dispersed in the recording liquid by surface processing the fine particles of the pigment.

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34. The liquid jet recording apparatus as claimed in claim 31, wherein the fine particles of the pigment contained in the recording liquid range from 2%
10 to 10% by weight,
wherein a solid content of the recording liquid including the fine particles of the pigment contained in the recording liquid is no more than 15% by weight.

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35. A liquid jet recording apparatus comprising:
20 a liquid jet head including a nozzle element having nozzles from which a recording liquid is ejected to a recording medium,
a carriage mounting the liquid jet head;
a guiding rod guiding the carriage;
25 a conveying roller conveying the recording

medium;

a holding roller holding the recording medium,
wherein the recording liquid contains fine
particles of a pigment,

5 wherein the fine particles of the pigment
contained in the recording liquid are no less than 1% by
weight,

wherein each of the nozzles has an area that
is less than $500 \mu\text{m}^2$,

10 wherein each of the fine particles of the
pigment has a diameter satisfying a relation of $0.0005 \leq$
 $D_p/D_o \leq 0.02$,

wherein "Dp" represents the diameter of each
of the fine particles of the pigment and "Do" represents
15 a size of each of the nozzles,

wherein when the nozzle element ejects the
recording liquid onto the recording medium, a contact
angle of the recording liquid stops changing when 100 ms
or less elapses after the recording liquid contacts the
20 recording medium,

wherein the recording medium has a surface
coated with a coating material,

wherein the fine particles of the pigment have
an average diameter that is equal to or less than an
25 average diameter of particles forming the coating

material,

wherein the average diameter of the fine particles of the pigment is smaller than smoothness of the coated surface of the recording medium.

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36. The liquid jet recording apparatus as
10 claimed in claim 35, wherein the fine particles of the pigment are dispersed in the recording liquid by including a dispersant in the recording liquid.

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37. The liquid jet recording apparatus as
claimed in claim 35, wherein the fine particles of the pigment are dispersed in the recording liquid by surface
20 processing the fine particles of the pigment.

25 38. The liquid jet recording apparatus as

claimed in claim 35, wherein the fine particles of the pigment contained in the recording liquid range from 2% to 10% by weight,

wherein a solid content of the recording liquid

5 including the fine particles of the pigment contained in the recording liquid is no more than 15% by weight.

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39. A liquid jet recording apparatus comprising:

a liquid jet head including a nozzle element having nozzles from which a recording liquid is ejected

15 to a recording medium,

a carriage mounting the liquid jet head;

a guiding rod guiding the carriage;

a conveying roller conveying the recording medium;

20 a holding roller holding the recording medium, wherein the recording liquid contains fine particles of a pigment,

wherein the fine particles of the pigment contained in the recording liquid are no less than 1% by
25 weight,

wherein each of the nozzles has an area that is less than $500\mu\text{m}^2$,

wherein each of the fine particles of the pigment has a diameter satisfying a relation of $0.0005 \leq$
5 $D_p/D_o \leq 0.02$,

wherein "Dp" represents the diameter of each of the fine particles of the pigment and "Do" represents a size of each of the nozzles,

wherein when the nozzle element ejects the
10 recording liquid onto the recording medium, a contact angle of the recording liquid stops changing when 100 ms or less elapses after the recording liquid contacts the recording medium,

wherein the recording medium is a resin
15 material having a surface coated with a coating material,

wherein the fine particles of the pigment have an average diameter that is equal to or less than an average diameter of particles forming the coating material,

20 wherein the average diameter of the fine particles of the pigment is smaller than smoothness of the coated surface of the recording medium.

40. The liquid jet recording apparatus as
claimed in claim 39, wherein the fine particles of the
pigment are dispersed in the recording liquid by
5 including a dispersant in the recording liquid.

10 41. The liquid jet recording apparatus as
claimed in claim 39, wherein the fine particles of the
pigment are dispersed in the recording liquid by surface
processing the fine particles of the pigment.

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42. The liquid jet recording apparatus as
claimed in claim 39, wherein the fine particles of the
20 pigment contained in the recording liquid range from 2%
to 10% by weight,
wherein a solid content of the recording liquid
including the fine particles of the pigment contained in
the recording liquid is no more than 15% by weight.

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43. A recording liquid used in a liquid jet
5 head including a nozzle element having nozzles from
which the recording liquid is ejected to a recording
medium, the recording liquid comprising:
fine particles of a pigment,
wherein the fine particles of the pigment
10 contained in the recording liquid are no less than 1% by
weight,
wherein each of the nozzles has an area that
is less than $500 \mu\text{m}^2$,
wherein each of the fine particles of the
15 pigment has a diameter satisfying a relation of $0.0005 \leq$
 $D_p/D_o \leq 0.02$,
wherein "Dp" represents the diameter of each
of the fine particles of the pigment and "Do" represents
a size of each of the nozzles,
20 wherein when the nozzle element ejects the
recording liquid onto the recording medium, a contact
angle of the recording liquid stops changing when 100 ms
or less elapses after the recording liquid contacts the
recording medium,
25 wherein the fine particles of the pigment are

smaller than fibers of the recording medium,

wherein the fine particles of the pigment are smaller than spaces between the fibers of the recording medium.

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44. The recording liquid as claimed in claim
10 43, wherein the fine particles of the pigment are dispersed in the recording liquid by including a dispersant in the recording liquid.

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45. The recording liquid as claimed in claim
44, wherein the fine particles of the pigment are dispersed in the recording liquid by surface processing
20 the fine particles of the pigment.

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46. The recording liquid as claimed in claim

43, wherein the fine particles of the pigment contained
in the recording liquid range from 2% to 10% by weight,
wherein a solid content of the recording liquid
including the fine particles of the pigment contained in
5 the recording liquid is no more than 15% by weight.

10 47. A recording liquid used in a liquid jet
head including a nozzle element having nozzles from
which the recording liquid is ejected to a recording
medium, the recording liquid comprising:

fine particles of a pigment,
15 wherein the fine particles of the pigment
contained in the recording liquid are no less than 1% by
weight,

wherein each of the nozzles has an area less
than $500 \mu\text{m}^2$,

20 wherein each of the fine particles of the
pigment has a diameter satisfying a relation of $0.0005 \leq$
 $D_p/D_o \leq 0.02$,

wherein "Dp" represents the diameter of each
of the fine particles of the pigment and "Do" represents
25 a size of each of the nozzles,

wherein when the nozzle element ejects the recording liquid onto the recording medium, a contact angle of the recording liquid stops changing when 100 ms or less elapses after the recording liquid contacts the
5. recording medium,

wherein the recording medium has a surface coated with a coating material,

wherein the fine particles of the pigment have an average diameter that is equal to or less than an
10 average diameter of particles forming the coating material,

wherein the average diameter of the fine particles of the pigment is smaller than smoothness of the coated surface of the recording medium.
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48. The recording liquid as claimed in claim
20 47, wherein the fine particles of the pigment are dispersed in the recording liquid by including a dispersant in the recording liquid.

49. The recording liquid as claimed in claim
47, wherein the fine particles of the pigment are
dispersed in the recording liquid by surface processing
5 the fine particles of the pigment.

10 50. The recording liquid as claimed in claim
47, wherein the fine particles of the pigment contained
in the recording liquid range from 2% to 10% by weight,
wherein a solid content of the recording liquid
including the fine particles of the pigment contained in
15 the recording liquid is no more than 15% by weight.

20 51. A recording liquid used in a liquid jet
head including a nozzle element having nozzles from
which the recording liquid is ejected to a recording
medium, the recording liquid comprising:
fine particles of a pigment,
25 wherein the fine particles of the pigment

contained in the recording liquid are no less than 1% by weight,

wherein each of the nozzles has an area that is less than $500 \mu\text{m}^2$,

5 wherein each of the fine particles of the pigment has a diameter satisfying a relation of $0.0005 \leq D_p/D_o \leq 0.02$,

 wherein "Dp" represents the diameter of each of the fine particles of the pigment and "Do" represents
10 a size of each of the nozzles,

 wherein when the nozzle element ejects the recording liquid onto the recording medium, a contact angle of the recording liquid stops changing when 100 ms. or less elapses after the recording liquid contacts the
15 recording medium,

 wherein the recording medium is a resin material having a surface coated with a coating material,

 wherein the fine particles of the pigment have an average diameter that is equal to or less than an
20 average diameter of particles forming the coating material,

 wherein the average diameter of the fine particles of the pigment is smaller than smoothness of the coated surface of the recording medium.

52. The recording liquid as claimed in claim
5 51, wherein the fine particles of the pigment are
dispersed in the recording liquid by including a
dispersant in the recording liquid.

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53. The recording liquid as claimed in claim
51, wherein the fine particles of the pigment are
dispersed in the recording liquid by surface processing
15 the fine particles of the pigment.

20 54. The recording liquid as claimed in claim
51, wherein the fine particles of the pigment contained
in the recording liquid range from 2% to 10% by weight,
wherein a solid content of the recording liquid
including the fine particles of the pigment contained in
25 the recording liquid is no more than 15% by weight.